U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Bidens micrantha* ssp. *ctenophylla*

COMMON NAME: Ko'oko'olau

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: July 2005

STATUS/ACTION:

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

___ New candidate

__X_ Continuing candidate

___ Non-petitioned

_X__ Petitioned - Date petition received: May 11, 2004

_ 90-day positive - FR date:

_X_ 12-month warranted but precluded - FR date: _May 11, 2005

_N_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? _yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? _yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov).

___ Listing priority change

Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined): 1996

___ Candidate removal: Former LP: ___

___ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Asteraceae (Sunflower family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Hawaii

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Hawaii

LAND OWNERSHIP: One of the largest populations of *Bidens micrantha* ssp. *ctenophylla*, totaling approximately 1,000 individuals, occurs on private land, representing one third of the taxon. The remaining individuals occur on State-owned land that is in the process of being developed for low and moderate income housing.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Bidens micrantha* ssp. *ctenophylla* is an erect, perennial herb, 0.5 to 1.5 meters (m) (1.6 to 5 feet (ft)) tall, and slightly woody at the base. The leaves are simple or occasionally trifoliate, 6 to 19 centimeters (cm) (2.4 to 7.5 inches (in)) long, with 1 to 9 leaflets that are ovate-lanceolate, 3.5 to 13.5 cm (1.4 to 5.3 in) long, 0.5 to 6 cm (0.2 to 2.2 in) wide, and not ciliate on margins. Flower heads are small compound cymes, with 5 to 9 rays per head that are 7 to 16 mm (0.3 to 0.6 in) long. Rays and corollas are yellow. The achenes are straight, awned, rarely winged, 5 to 14 millimeters (mm) (0.2 to 0.6 in) long, 0.7 to 1.5 mm (0.03 to 0.06 in) wide, and glabrous (Ganders and Nagata 1999).

Taxonomy *Bidens micrantha* ssp. *ctenophylla* was first described by Nagata and Ganders. This subspecies is recognized as a distinct taxon in Ganders and Nagata (1999) and Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat *Bidens micrantha* ssp. *ctenophylla* is found scattered on slopes, ridges, and cliffs in open mixed shrubland to dry *Metrosideros* forest at elevations ranging from 183 to 634 m (600 to 2,080 ft). The typical habitat substrate is relatively recently deposited a'a lava. Commonly associated species are: *Psydrax odorata*, *Myoporum sandwicensis*, *Reynoldsia sandwicensis*, and *Sophora chrysophylla* (Hawaii Heritage Program 1992; Ganders and Nagata 1999; Marie Bruegmann, U.S. Fish and Wildlife Service, *in litt*. 1994; Hawaii Natural Heritage Program Database 2004).

Historical and Current Range/Current Status This subspecies is endemic to the district of North Kona on the island of Hawaii, where it is restricted to an area of less than 10 square miles (26 square kilometers). This subspecies is known from four populations totaling approximately 3,000 individuals, the majority of which occur in only two populations, even though there is no obvious difference in habitat type between the four populations (Hawaii Heritage Program 1992; M. Bruegmann, *in litt*. 1994; Hawaii Natural Heritage Program Database 2004).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. Land development for housing and commercial activities threatens *Bidens micrantha* ssp. *ctenophylla*. The two largest populations are on private and State lands that are in various stages of development for residential and commercial purposes (M. Bruegmann, *in litt*. 1994; M. Bruegmann, pers. comm. 2005). To date, three of the villages to be developed have been completed. No known conservation measures have been taken to date to address this threat.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
None known.

C. Disease or predation.
None known.

D. The inadequacy of existing regulatory mechanisms.
Currently, there is no Federal or State protection for this subspecies.

E. Other natural or manmade factors affecting its continued existence. Fire is a major threat to *Bidens micrantha* ssp. *ctenophylla*, and is exacerbated by the presence of several introduced plant species, such as *Pennisetum setaceum* (fountain grass) and *Leucaena leucocephala* (koa haole) (M. Bruegmann, *in litt*. 1994; M. Bruegmann, pers. comm. 2005). Because Hawaiian plants were subjected to fire during their evolution only in areas of volcanic activity and from occasional lightning strikes, they are not adapted to recurring fire regimes and do not quickly recover following a fire. Alien plants are often better adapted to fire than native plant species, and some fire-adapted grasses such as fountain grass have become widespread on the west side of the island of Hawaii, where *B. micrantha* ssp. *ctenophylla* occurs. Native shrubland and dry forest can thus be converted to land dominated by alien grasses, and this is occurring in the areas where *B. micrantha* ssp. *ctenophylla* is found, from both the spread of alien vegetation and the

high rates of fire in dry summer months. The presence of such species in Hawaiian ecosystems greatly increases the intensity, extent, and frequency of fire, especially during drier months or drought. Fire-adapted alien plant taxa can reestablish in a burned area, resulting in a reduction in the amount of native vegetation after each fire. Fire can destroy dormant seeds as well as plants. Fires may result from natural causes, or may be accidentally or purposely started by humans (Cuddihy and Stone 1990, D'Antonio and Vitousek 1992; Friefelder *et al.* 1998).

Alien plant species threaten this species (M. Bruegmann, *in litt*. 1994). Although the exact pest species that threaten this plant have not been identified, alien pest plants are found throughout the areas where this species occurs. The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al*. 1999a). Confirmed personal observations (M. Bruegmann, *in litt*. 1994) and several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al*. 1998) indicate nonnative plant species may outcompete native plants similar to *Bidens micrantha* ssp. *ctenophylla*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al*. 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al*. 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to the open mixed shrubland to dry *Metrosideros* forest habitat of *B. micrantha* ssp. *ctenophylla*, the Service believes nonnative plant species are a threat to *B. micrantha* ssp. *ctenophylla*. Currently, many widespread alien plant taxa cannot be completely eradicated from the island of Hawaii, and therefore are expected to continue dispersing into previously managed areas (Loope 1998, Smith 1985). No known conservation measures have been taken to date to address this threat.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

Several years ago, the Service unsuccessfully attempted to develop a conservation agreement with the private landowner. The Service has also encouraged the State to develop a preserve for the largest population on State-owned land. The State is concerned about the perceived effect of the presence of a listed species on the site of their proposed low-income housing development, though another endangered species, *Caesalpina kavaiensis,* already occurs at the site.

This species is represented in an *ex situ* collection (U.S. Fish and Wildlife Service Controlled Propagation Database 2005).

SUMMARY OF THREATS:

The major threats to this species include development, fire, and nonnative plants. No on-the-ground conservation efforts have been initiated. This species is represented in an *ex situ* collection.

LISTING PRIORITY:

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	2
		Subspecies/population	**3***
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:
Two populations of this subspecies are highly threatened by land development, and all are threatened by fire which degrades habitat, and nonnative plants, such as *Pennisetum setaceum* and *Leucana leucocephala,* which increase the probability of fire by adding to the fuel load and replacing native species after a fire. Threats to mixed shrubland and dry forest habitat of *Bidens micrantha* ssp. *ctenophylla* occur throughout its range, and are expected to continue or increase without control or eradication. No on-the-ground conservation efforts have been initiated. This species is represented in an *ex situ* collection.

Imminence:
Threats to *Bidens micrantha* ssp. *ctenophylla* from land development, fire, and nonnative plants are considered imminent because they are ongoing. To date, three of the villages have been developed and several more are being planned.

__Yes__ Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. *Bidens micrantha* ssp. *ctenophylla* is currently known from four populations totaling 3,000 individuals. The subspecies is threatened by land development and competition with nonnative plants. The subspecies does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this subspecies' extinction, then the emergency rule process for this subspecies will be initiated. We will continue to monitor the status of *B. micrantha* ssp. *ctenophylla* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING:
We have incorporated information on this subspecies from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. No new information on status or range was provided in 2004. In 2005 we contacted the species experts listed below, and confirmation of the status of *Bidens micrantha* ssp. *ctenophylla* was provided by Marie Bruegmann, Service.

The Hawaii Natural Heritage Program identified this subspecies as critically imperiled (Hawaii Natural Heritage Program 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this subspecies is recognized as Vulnerable (could be become at risk if threats are not controlled) by Wagner *et al.* (1999b).

One species expert has provided new information confirming the status of the species this year and the results are included in this assessment.

COORDINATION WITH STATES:
In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for *Bidens micrantha* ssp. *ctenophylla* and suggested that this taxon may meet the interim recovery objectives for Hawaiian plants, and therefore may not warrant listing. The interim recovery objectives for a short-lived species such as this taxon are aimed at stabilizing the species and preventing extinction in the near future, and include 1) the existence of 3 populations of 50 reproducing individuals each, 2) all threats managed and, 3) the species in genetic storage. None of the populations currently meet these guidelines, as the numbers are not at this level and the threats are ongoing. While this species is in genetic storage, only two of the four populations have numbers greater than 50 reproducing individuals and none

of the threats are being controlled. Therefore, we believe listing is warranted for *B. micrantha* ssp. *ctenophylla.*

LITERATURE CITED and REFERENCES:

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	June 28, 2005	National Tropical Botanical Garden
9. Ken Wood	June 28, 2005	National Tropical Botanical Garden
10. Marie Bruegmann*	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

*Provided new information on this taxon in 2005

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	1992, 2004
2. U.S. Fish and Wildlife Service Controlled Propagation Database	2005

Other resources utilized:

Bruegmann, M.M. 1994. Memo to files regarding site visits to several candidate species, January 25, 1994.

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.

D'Antonio, C.M. and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle and global change. Annual Review of Ecology and Systematics 23: 63-88.

Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai`i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.

Friefelder, R.R., P.M. Vitousek, and C.M. D'Antonio. 1998. Microclimate change and effect on fire following forest-grass conversion in seasonally dry tropical woodland. Biotropica

30: 286-297.
Geesnick, R., W.L. Wagner, and D.R. Herbst. 1999. Fabaceae: *In* Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the Flowering Plants of Hawai'i. University of Hawaii Press and Bishop Museum Press, Honolulu. Bishop Mus. Spec. Publ. 97: 629-720.
Loope, L.L. and A.C. Medeiros. 1992. A new and invasive grass on Maui. Newsletter of the Hawaiian Botanical Society 31: 7-8.
Loope, L., F. Starr and K. Starr. 2004. Management and research for protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Weed Technology 18: 1472-1474.
Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvescens* DC (Melastomataceae) in the Hawaiian Islands. Bishop Mus. Occas. Pap. 48: 23-36.
Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.
O'Connor, P.J. 1999. Poaceae: *In* Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. University of Hawaii Press and Bishop Museum Press, Honolulu. Bishop Mus. Spec. Publ. 97: 1481-1604.
Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. Endangered Species Bulletin. November/December.
Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. Studies in Avian Biology 9:1-429. Cooper Ornithological Society, Los Angeles.
Smathers, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya* Aiton) population, Hawai`i. Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park, pp. 274-288.
Smith, C.W. 1985. Impact of alien plants on Hawai`i's native biota: *In* Stone, C.P., and J.M. Scott (eds.), Hawai`i's Terrestrial Ecosystems: Preservation and Management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.
Vitousek, P.M., C.M. D'Antonio, L.L. Loope, M. Rejnanek, and R. Westerbrooks. 1997. Introduced species: a significant component of human-caused global change. New Zealand Journal of Ecology 21(1): 1-16.
Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999a. Manual of the Flowering Plants of Hawai`i. Bishop Mus. Spec. Publ., 97: 1-1918. University of Hawaii Press and Bishop Museum Press, Honolulu.
Wagner, W.L., M.M. Bruegmann, and J.Q.C. Lau. 1999b. Hawaiian vascular plants at risk: 1999. Bishop Mus. Occas. Pap. 60: 1-58.
Wagner, W.L. and D.R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai‘i, version 3.1. December 12, 2003. Available from the Internet. URL: http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm.
Wenkam, R. 1969. Kauai and the Park Country of Hawaii. Sierra Club, San Francisco. 160 pp.
Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: Acting _____ 11/10/05
Regional Director, Fish and Wildlife Service Date

_____

Concur: August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: September 19, 2005
Conducted by: Marie M. Bruegmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell_____ Date: September 20, 2005
Plant Conservation Program Leader

Gina Shultz_____ Date: October 14, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard_____ Date: October 14, 2005
Field Supervisor